

REMARKS/ARGUMENTS

Claims 1-18, 21, 27, 28, 31, 34, and 35 have been cancelled. Claims 19, 22-25, 29, and 30 have been amended. Claims 19, 20, 22-26, 29, 30, 32, 33, 36, and 37 are pending. Claim 19 has an added range of the flow of CH₃F to total flow of the etchant gas.

Such a flow ratio range is supported by the flow ratios of the most preferred embodiments. For example, on page 10, lines 4 to 14, specify that the most preferable flow is about 250 sccm for H₂, about 750 sccm for N₂, and about 3 sccm for CH₃F. The total flow for the etchant gas is about $250+750+3=1003$ sccm. Therefore, the ratio of the flow of CH₃F to total flow of the etchant gas is about $3/1003$, which is about 0.3%. On page 11, lines 18 to 28, the most preferred flow is about 100 sccm for H₂, about 300 sccm for N₂, and about 5 sccm for CH₃F. The total flow of the etchant gas is about $100+300+5=405$ sccm. Therefore, the ratio of the flow of CH₃F to total flow of the etchant gas is about $5/405$, which is about 1.2%. On page 12, lines 20 to 26, the most preferred flow is about 1000 sccm for NH₃ and about 5 sccm CH₃F. The total flow of the etchant gas is about $1000+5=1005$. Therefore, the ratio of the flow of CH₃F to the total flow of the etchant is about $5/1005$, which is about 0.5%. On page 13, lines 12 to 18, the most preferred flow is about 500 sccm for NH₃ and about 10 sccm for CH₃F. The total flow of the etchant gas is about $500+10=510$ sccm. Therefore, the ratio of the flow of CH₃F to the total flow of the etchant gas is about $10/510$, which is about 2%. On page 14, lines 3 to 15, the most preferred flow is about 400 sccm Ar, about 100 sccm N₂, about 6 sccm O₂, and about 5 sccm CH₃F. The total flow of the etchant gas is about $400+100+6+5=511$ sccm. Therefore, the ratio of flow of CH₃F to the total flow of the etchant gas is about $5/511$, which is about 1%. On page 15, lines 1 to 10, the most preferred flow is about 1200 sccm for He, about 6 sccm for O₂, and about 3 sccm for CH₃F. The total flow for the etchant gas is about $1200+6+3=1209$ sccm. Therefore, the ratio of flow of CH₃F to the total flow of the etchant gas is about $3/1209$, which is about 0.25%. Therefore, the flow ratio of CH₃F to total etchant gas flow for the most preferred embodiments is within the range of about 0.25% to about 2%.

The Examiner rejected claims 19-37 under 35 U.S.C. § 103(a) as being unpatentable over Tao et al. (U.S. 6,194,128 B1) in view of Ye et al. (U.S. 6,080,529). Claim 19 has been amended to recited that the etchant gas comprises CH₃F and an active etchant, wherein the ratio of flow of CH₃F to total flow of the etchant gas is between about 0.25% and about 2%. This range is not

disclosed or suggested by the cited references. Tao teaches using the fluorine from CHF_3 as the main etchant. As a result, column 6, lines 42 to 48, of Tao teaches an etchant gas with a CHF_3 to total gas flow ratio of at least 5% to provide a higher fluorine concentration for the main etch. It has been found by the inventors that such a high concentration of fluorine increases the CD and causes bowing. The invention uses another active etchant for the main etch, and therefore only uses a small amount of CH_3F for removing micro masks. Such a low amount of CH_3F does not cause bowing or increase CD. Claim 19 has been amended to specifically recite CH_3F , since CH_3F provides the minimum amount of fluorine with the maximum amount of polymer. The increased amount of polymer allows the passivation of the sidewalls, to further help prevent bowing. The enclosed declaration further supports why the claimed invention is not obvious in view of the cited references. For at least these reasons, claim 19 is not made obvious by the cited references.

Claims 20, 22-26, 29, 30, 32, 33, 36, and 37 are ultimately dependent on claim 19, and are therefore respectfully submitted to be patentable over the art of record for at least the reasons set forth above with respect to claim 19. Additionally, these dependent claims require additional elements that when taken in the context of the claimed invention, further patentably distinguish the art of record. For example, claim 32 further recites that the low-k dielectric is silicon-free benzocyclobutene. For at least these reasons, claims 20, 22-26, 29, 30, 32, 33, 36, and 37 are not anticipated or made obvious by the cited references.

Applicants believe that all pending claims, as amended, are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at telephone number (831) 655-2300.

Respectfully submitted,
BEYER WEAVER & THOMAS, LLP



Michael Lee
Reg. No. 31,846

P.O. Box 778
Berkeley, CA 94704-0778
(831) 655-2300